



Safety & Mission Assurance

Presenter

M. D. Erminger

Date

March 26, 2002

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STS-110/8A

Flight Readiness Review



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Approach and General Description

S&MA held reviews in preparation for the STS-110/8A Flight Readiness Review on 6 and 22 March 2002 and is ready to proceed toward launch countdown.

FRR Briefing Overview

- **Significant assessments - *discuss***
- **Special topics**
 - **NASA Safety Reporting System (NSRS) - *discuss***
 - **Space Shuttle Hazard Analysis - *discuss***
 - **Space Shuttle FMEA/CIL – *discuss***
- **Space Shuttle and Space Station Independent Assessments - *discuss***
 - *Significant Open Work - none*
 - *CoFR Exceptions - none*
 - *Open Action Items - none*



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Significant Assessments

Orbiter

- Raytheon Transistor Intermetallic Growth
- STS-109 Freon Coolant Loop Degradation
- First Flight of OI-29 Software

SSME

- Block II HPFTP Turbine Blade Shot Peen Process

SRB

- STS-110 Hydraulic Pump Keenserts

ET/KSC

- STS-110/ET-114 Intertank Stringer Foam Damage

ADDITIONAL ASSESSED ITEMS ARE IN THE BACKUP CHARTS



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Significant Assessments

Space Station

- SSRMS Wrist Roll Joint Anomaly
- Fluid QD Hydraulic Lockup
- 8A Berthing Loads
 - Procedure allows 30 seconds for Crew intervention to control hazard

EVA

- Metal Oxide (METOX) Odor During Regeneration

ADDITIONAL ASSESSED ITEMS ARE IN THE BACKUP CHARTS



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OI-29 Flight Software – Safety Enhancements

- **Automated Alpha/Beta Management For TAL Aborts**
 - Reduces Crew Workload During Time-critical Period and Increases Flight Safety by Reducing Probability of ET Debris Hitting the Orbiter
- **RCS (Pressure, Volume, Temperature) PVT Sensor Change**
 - Retains Crew/ground RCS Leak Detection Insight If MDM FA1 or FA2 is Lost
- **Priority Rate Limiting Improvement**
 - Improves Probability of Success for Single APU Landing by Reducing Potential For APU Pump Over-demand
- **Change TAL Post-MECO ARCS 4 +X OMS Propellant Settling Burn**
 - Decreases Probability Of ET Debris Hitting the Orbiter
- **MPS LO2 Geyser Prevention**
 - Automates MPS LO2 Safing Procedures for a Pad Abort or a Launch Scrub



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Space Shuttle and Space Station Independent Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
JS-0038	Evaluation of RM2667-001 EEPROM Deficiencies Affecting Electrical Power System (EPS) Orbital Replacement Units (ORUs)	12/28/01
JS-1015	Adequacy of ISS Software Verification Plans and Schedules for Flight 8A	2/28/02
JS-0031	Thermal Evaluation of the S0 Truss in Support of the Functional Configuration Audit (FCA)	10/22/01
JA-1126	Revisit of the Analysis of the Commanding Processes for ISS	12/10/01
JA-1131	Evaluation of ISS Command Link Security Analysis	2/08/02
HS-1001	Mobile Transporter (MT) Element Level Physical Configuration Audit (PCA) Assessment	11/09/00
HS-1002	Integrated Truss Segment (ITS) S0 Functional Configuration Audit (FCA) Part 1 Assessment	11/29/00
HS-1004	Module to Truss Structure Attach System – Passive (MTSAS-P) Acceptance Review (AR) 2 Assessment	11/16/00
HS-1007	Incremental Configuration Audit (ICA) #4 Assessment for the Integrated Truss Segment (ITS) S0.	2/21/01
HS-1008	Integrated Truss Segment (ITS) S0 Functional Configuration Audit (FCA) Final Assessment.	3/16/01
HS-1010	Integrated Truss Segment (ITS) S0 Physical Configuration Audit (PCA) Assessment	3/26/01
HS-1011	Mobile Transporter (MT) Physical Configuration Audit (PCA) Assessment	4/10/01
JA-9109	Assessment of the Mobile Transporter (MT) During Functional Configuration Audit 2	6/30/01
JS-0029	Structural Evaluation of the S0 Truss Support of the FCA Audit	2/07/01
JS-1009	Investigation of Mobile Servicing System (MSS) Assembly and Capabilities	4/30/01



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Space Shuttle and Space Station Independent Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
JS-1026	Evaluation of Mobile Transporter Thermal Behavior for the Rev. F Assembly Sequence	9/19/01
HS-0002	FCA/PCA Assessment for the Module to Truss Structure (MTS) Adjustable Struts	2/23/00
HS-0005	Mobile Transporter (MT) Element Level Functional Configuration Audit (FCA) Assessment	7/25/00
HS-0006	Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA) Assessment for the Module to Truss Structure (MTS) Attach System	8/23/00
HS-0007	Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA) Assessment for the Motorized Bolt Assembly (MBA)	8/23/00
HS-0008	Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA) Assessment for the Trailing Umbilical System (TUS)	8/30/00
HS-0009	Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA) Assessment for the Bolt Bus Controller (BBC)	9/01/00
HS-9013	Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA) Assessment for the Mobile Transporter (MT) CI Level FCA/PCA Part 2	10/06/99
JS-0051	Evaluation of Extravehicular Mobility Unit Oxygen System Contamination Mitigation Plans	9/12/00
JS-9052	Readiness Review of ISS Berthing Operations for Flights 3A to 9A	11/05/99
HS-9009	Integrated Truss Segment (ITS) S0 Secondary Structure Incremental Configuration Audit (ICA) Number Two	5/14/99
HS-9012	Incremental Configuration Audit (ICA) #3 Assessment for the Integrated Truss Segment S0	9/24/99
HS-0001	Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA) Assessment for the Umbilical Mechanism Assembly (UMA), Active and Passive	2/01/00
JSC-98-004	PDR of the Oxygen Recharge Compressor Assembly System	11/03/97



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Space Shuttle and Space Station Independent Assessments

<u>Number</u>	<u>Title</u>	<u>Disposition</u>
IA2-1002	Evaluation of MT Thermal Status from MT Component FCA	Closed
IA2-1003	MT: SSRMS Failure Modes	Closed
IA2-1004	Lack of Requirements for Berthing Corridor Definition	Closed
IA2-1005	MT: Flight Qual Requirements	Closed
IA2-1006	MT: Fit Checks Across Multiple Truss Segments Need to be Performed	Closed
IA2-1012	Review QD's Manifested on 8A and Assess Level of Fidelity of Fit Check S0/P1 and S0/S1	Closed
IA2-1013	Evaluate Impacts to SM Depress NCR Approval Given the Slip of 8A Software to 12A Timeframe	Closed
IA2-1015	Adequacy of External Control Zone (ECZ) Software Testing	Closed



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NSRS Summary

There are no NASA Safety Reporting System reports open that are applicable to STS-110.

Hazard Analysis Summary

There are no new Accepted Risk hazards identified for STS-110.

FMEA/CIL Summary

There are no new Criticality 1 failure modes identified for STS-110.



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STS-110/8A Readiness Statement

With the satisfactory completion of identified open work, Safety and Mission Assurance has no constraints to STS-110/8A. S&MA has no issues that constrain any of the mission success criteria.

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SR&QA Director, JSC

/s/ Shannon Bartell

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Backup Package



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Raytheon Transistor Intermetallic Growth Risk Assessment

- **No criticality 1R/2 or above applications contain the suspect LDC 7525**
- **At least one failure tolerant for all LCCs related to measurements impacted by LDC 7525**
 - A total number of 27 unique LCCs are impacted
 - A total number of 95 measurements associated with an LCC
- **No cases in which one failure of a LDC 7525 transistor can cause the loss of both the primary and secondary measurements processed by a DSC**
- **Analysis does not show a general end-of-life concern for 2N3019 transistors from any manufacturer or lot other than LDC 7525**
- **Criticality 1R/3 measurements are limited to:**
 - 20 RCS (primary thruster); 4 Main Engine; 4 PCMMU; 3 MPS; 2 COAS; and 1ECLSS
- **4 RCS vernier fuel and oxidizer injector temperature measurements are Criticality 2/2 generically, but only results in loss of reboost capability for STS-110**
 - Loss of a vernier injector temperature measurement results in deselection of that thruster and subsequent loss of all vernier control
 - Vernier control is necessary for reboost, but not for primary mission objectives



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Additional Assessments

Orbiter

- First Flight of Modular Memory Unit (MMU) LRU Replacement
- First Flight of Block II Engine Cluster
- First Flight of Delayed TAL Implementation
- Payload Bay Door Strong Back Damage
- OMS Pod Attach Point #5 Anomaly
- WCS Check Valve Leak Check Failure
- MLG Wheel Bearing Test Anomaly
- OI-29 Telemetry/Command change incorporation into MCC software
- AMEC Power on Reset Anomaly
- STS-109 EMU Water Leak Issue
- STS-109 FES Accumulator/Hi-Load H2O Feedline B, Heater System 2 Failure



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Additional Assessments

EVA

- STS-109 EMU Battery Leakage
- EMU Radiation Monitor

ET

- LH2 Changes for SSME Block II Configuration

SSME

- First Flight of SSME Block II Cluster
- Block II HPFTP Turbine Exit Diffuser Inner Diameter Cracking

RSRM

- STS-110 Left Hand Aft Segment Re-Cast

KSC SHIA

- KSC OI-29 Telemetry/Command change incorporation into LCC software